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September 27, 2017

***EX PARTE* NOTICE VIA ECFS**

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

RE: *Notice of Ex Parte Communication*; Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard; GN Docket No. 16-142

Dear Ms. Dortch,

On Tuesday, September 26, 2017 T-Mobile USA, Inc. ("T-Mobile") met with staff of the Federal Communications Commission to discuss the attached presentation. Present for T-Mobile were Steve Sharkey, Chris Wieczorek, and Tom Dombrowsky of DLA Piper LLP (Engineering Advisor to T-Mobile). Attending from the Commission were Martha Heller of the Media Bureau and Julius Knapp, Walter Johnston, Martin Doczkat, Paul Murray, Matthew Hussey, Mark Colombo, and James Miller (via phone) of the Office of Engineering and Technology.

Consistent with the attached presentation, T-Mobile reviewed the technical white paper it provided for the record on September 11, 2017 in this proceeding that describes the significant detrimental effects associated with incorporating ATSC 3.0 functionality into mobile devices used by the wireless industry. While T-Mobile has no issue with voluntary adoption of ATSC 3.0 technology, it is concerned by calls for a mandate to force inclusion of the technology in mobile devices. Counter to the assertions of NAB and others, parties have called for a mandate and T-Mobile supplied details on the entities seeking a Commission mandate to include ATSC 3.0 capabilities within mobile devices.

Pursuant to Section 1.1206(b)(2) of the Commission's rules, the attached has been filed electronically with the Commission. Please direct any questions regarding this filing to the undersigned.

Respectfully submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey
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T-Mobile USA, Inc.
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Attachment

ATSC 3.0 and Mobile Deployment Challenges

September 26, 2017

Overview

- T-Mobile
  - Largest winner of 600 MHz band spectrum in the incentive auction
  - Working to rapidly deploy competitive wireless services.
- Multiple parties have argued in the Next Generation Broadcast Television Standard docket for an ATSC 3.0 mandate for mobile devices.
- Mandating ATSC 3.0 mobile reception would harm device performance, efficient use of spectrum, and competition (especially in the 600 MHz band).
- In particular:
  - Mobile devices would require a new receiver chain for ATSC 3.0 reception;
  - A new antenna (or more likely a new antenna array) would be needed that would likely degrade performance for LTE, 5G, and ATSC 3.0 reception;
  - Physical space is at a premium in mobile devices and should be available for more valuable uses than ATSC 3.0 reception; and
  - Modifications to allow ATSC 3.0 reception will make those mobile devices uncompetitive commercially.

ATSC 3.0 Mandate Proponents

- Several parties, including NAB members, have argued for Commission action to mandate ATSC 3.0 reception in mobile devices.

- The Advanced Television Broadcast Alliance (Sinclair and Gray TV on the ATBA Board)
  - "We urge the Commission to take steps to ensure that all devices that are designed to receive via radiofrequency transmissions and display television pictures received by those transmissions be capable of receiving and displaying all Next Gen TV broadcasts."[1]
  - "Without a nudge from the FCC, the combination of the "chicken and egg" problem and competitive resistance from wireless companies that are expanding into broadcasting could delay or altogether prevent many Americans from enjoying the benefits of Next Gen TV technology."[2]

- ONE Media
  - Has suggested that if "there is a marketplace failure or critical need to facilitate emergency warnings/information, the Commission can revisit the need to require 3.0 reception capacity in all receive devices."[3]

- Sinclair, Mark Aitken
  - "Our concern, be it demonstrated by T-Mobile and others, is that, in fact, the free market is not functioning the way that regulators believe it can or should."[4]

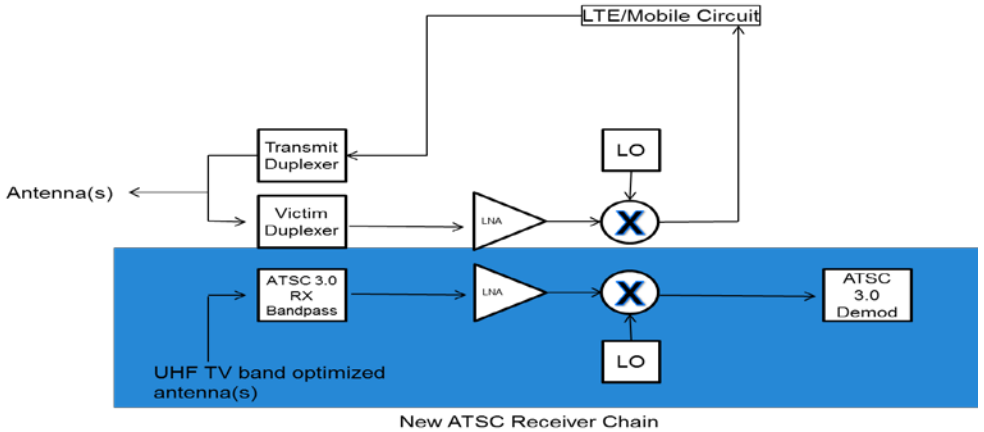
- Free Access & Broadcast Telemedia
  - Suggests that a "broad mandate should apply to mobile devices and should encompass any device that is designed to receive television pictures broadcast simultaneously with sound."5

[1] Comments of ATBA, GN Docket No. 16-142 at 4 (filed May 9, 2017).
[2] *Id.* at 8.
[3] Comments of ONE Media, GN Docket No. 16-142 at 52 (filed May 9, 2017).
[4] Communications Daily at 14 (Sept. 13, 2017).
[5] Reply Comments of Free Access & Broadcast Telemedia, GN Docket No. 16-142 at 3 (filed June 8, 2017).

New Receiver Chain Required

- Sinclair and ONE Media have suggested that integration of an ATSC 3.0 chip will be all that is necessary to enable reception by mobile devices.

- ATSC 3.0 reception will require significant changes to mobile smartphones, beginning with the addition of a new receiver chain that would include (at a minimum):
  - A new ATSC 3.0 receive bandpass filter;
  - A new low noise amplifier;
  - A new local oscillator; and
  - An ATSC 3.0 demodulator receive chip.



New ATSC Receiver Chain

New Receiver Chain Required (cont.)

- New ATSC 3.0 circuitry will entail significant design and integration costs.
  - Just for new materials within each mobile device would likely add at least $5+ per device in cost increases.
  - Resource costs (as well as the opportunity cost of not working on other projects) will cause an increase in the cost per device.
  - Based on normal equipment vendor pricing could result in as much as $30 in added costs per device.

- Sinclair's offer of 1 million ATSC chips is insignificant compared to the U.S. or global mobile device marketplace.
  - Over 1.5 billion smartphones were sold globally in 2016.
  - 262 million active smartphones just in the U.S. by the end of 2016.
  - Smartphone manufacturers are working to limit the number of models that are provided and avoid developing market or operator-specific versions.

Antenna Issues With ATSC 3.0

- A new antenna (or antenna array) will be required to receive ATSC 3.0 in mobile devices.

- Extending the antenna bandwidth to include the ATSC 3.0 UHF-TV band would affect antenna efficiency.
  - 2.2 to 10 dB of losses in efficiency.
  - Reduction in overall antenna performance at both ATSC and mobile frequencies which would degrade reception of both ATSC 3.0 and LTE/5G signals.
  - Additional filtering would be required to protect ATSC 3.0 and mobile receivers from de-sense.
  - The new antenna system would need to be tunable to limit reception to just ATSC 3.0 or LTE/5G, which would degrade performance of the mobile device and add costs.

Mobile Device Space Constraints

- Mobile devices are densely packed with batteries, filters, sensors, and other processors.
- Most devices must support up to 15 different mobile spectrum bands, along with Wi-Fi, Bluetooth, and other low-power services.
- Adding the substantial receiver chain needed to support ATSC 3.0 reception is infeasible without sacrificing other needed functionality.
- For example, 4x4 MIMO would provide much more value for subscribers.
  - 4x4 MIMO would increase the robustness of the receiver, improve data rates, and reduce susceptibility to interference.
  - Improvements from 4x4 MIMO would allow for better provision of all mobile services such as emergency alerts, E911, voice calls, video, text messaging, and data.
  - In contrast, ATSC 3.0 only provides limited one-way video and data services.

Other Concerns Raised in the Record

- **Ethertronics:** "Integration of additional radio system functionality into smartphones has the potential to cause multiple problems in terms of interference, reduced cellular radio performance, and volume constraints (industrial design)."

- **Qualcomm:** "In light of the detrimental effects that including ATSC 3.0 support can have on the cost and size of a mobile device, the technology trade-offs required to accommodate competing technologies, and the reduced performance and spectral efficiency that it may have on other mobile bands and services, the decision to include ATSC 3.0 support in a mobile device should be a voluntary decision for the marketplace to decide, and, again, any proposal that the FCC mandate ATSC 3.0 support should be deemed out of the question."

- **Nokia:** "We urge that the Commission not mandate the inclusion of ATSC 3.0 in a device, but instead allow equipment vendors and service providers to compete to win customers, based on cost and the features that consumers demand in the competitive market for wireless equipment and services."

- **Ericcson:** "As T-Mobile notes, adding ATSC 3.0 reception capability to mobile handsets is a complex task. It is not nearly as simple as just adding a new chip to a mobile device. It will affect the cost and size of mobile devices and due to the technological trade-offs involved will reduce the performance of the mobile device."

- **Motorola Mobility:** "Consequently, Motorola is concerned about calls from some parties (none of them equipment manufacturers) that the FCC mandate the inclusion of ATSC 3.0 receivers in smartphones and other mobile devices. Mandating equipment functionality without regard to consumer demand is not in the public interest."

Conclusion

- Mobile reception of ATSC 3.0 is a complex issue that will require substantial modifications to existing devices.
- Deployment of this capability will affect device performance, especially in the newly licensed 600 MHz band.
- If T-Mobile's access and use of the 600 MHz band is delayed or degraded, consumers will be deprived of service and wireless competition will suffer.
- The Commission should allow the market to decide if the detrimental effects that inclusion of ATSC 3.0 can have on the cost and size of a mobile device can be overcome.

Thank you